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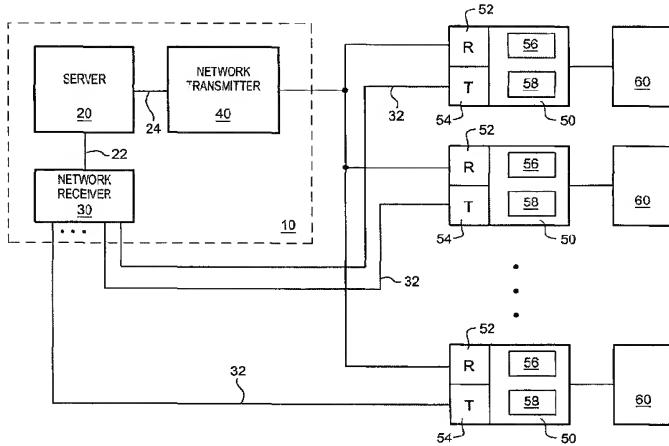
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(54) Title: SYSTEM AND METHOD FOR PORTABLE INTERACTIVE MULTI-PLAYER GAMES AND ENTERTAINMENT



**WO 02/49732 A1**

(57) Abstract: The invention provides a system, method and apparatus for mobile multi-player interactive game playing and other interactive data activities. The system has a host server computer (20). The host server computer (20) transmits data to one or more broadcast facilities, either through traditional radio frequency broadcasting or through transmission over high bandwidth cable. Individual users have a remote entertainment system comprising a processor, a memory and a display. Each remote entertainment system is capable of receiving the broadcast data from the host server computer (20), and transmits data to the host server computer (20). Such data transmission preferably includes wireless transmission, as well as connectors for various other data transmission channels, including telephone, cable television cables. By transmitting data from the network (host) server by broadcasting, identical data including programming for the processors is simultaneously broadcast by the network transmitter to a plurality of the remote receivers of the remote user entertainment systems.



*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**SYSTEM AND METHOD FOR PORTABLE INTERACTIVE MULTI-PLAYER  
GAMES AND ENTERTAINMENT**

**PRIORITY OF INVENTION**

The present application claims priority from provisional United States Patent  
5 Application 60/258,155, filed December 21, 2000.

**FIELD OF THE INVENTION**

The present invention relates to electronic or video games, and more specifically to interactive multi-party entertainment systems.

**BACKGROUND OF THE INVENTION**

10 Electronic video games have been popular consumer products for many decades. Such games allow the user to interact with either a computer-simulated opponent or other human players in a wide variety of simulated settings.

15 In recent years, the widespread use of the Internet has allowed computer users to play computer-based games with competitors across the world. In these multi-player games individual users either compete against each other, or to work cooperatively towards a common goal in a computer-simulated world.

20 Unfortunately, such games have several significant limitations. First, they require a direct connection to the Internet. This requires that the games be played on a computer connected to a telephone line. Home computers have traditionally been solitary-use devices located in a user's study, bedroom, or other location away from the social center of the home. Video game consoles, by contrast, are connected to televisions in living rooms and dens, and are at the social center of the home. Each location has its own limitations, and both are fixed devices, not easily portable between rooms, or to a user travelling away from home.

25 The problems with Internet connection are best understood in light of the common arrangement for multi-player games. Each user has a computer that has a (presumably) licensed copy of the software for the game. Such software contains predefined image components for display (walls, floors, items, etc.), as well as rules for game mechanics. Typically but not exclusively, the game is designed to be able to be played against a 30 computer component on the home computer without any Internet connection, with multi-player play being a further playing option.

The computer then connects to a dedicated central gaming server computer, which exchanges packets of data with users over the Internet. In the case of player-to-player standalone games, the server simply acts as a conduit and timing control regulator for data flow between players. However, this conduit encounters all problems associated  
5 with regular Internet connection – packet congestion due to high Internet usage, dropped lines, duplication of data sent to multiple-players in serial. In addition, the system is typically immobile, tied to a telephone line or cable television cable modem that limits the mobility of the user's system.

In many recent games, the server itself is the main repository for the game data,  
10 with individual players acting in a simulated world generated by the server interacting with users' home computers. One example of such games is called a Massively Multiplayer Online Role Playing Game (MMORPG). Such games have as many as 100,000 players interacting in a virtual world simultaneously. In such cases a user's home computer acts as a user interface, using the home computer's excellent hardware to  
15 create convincing graphics and sounds. In such games all of the problems mentioned above exist, plus an increased duplication of data transmission.

One problem with such an arrangement is that sophisticated graphics, sounds and other user-interactive elements require large amounts of data that either must be stored in the user's computer or must be transmitted to the user from the server computer. This  
20 requires either dedication of large amounts of memory on the user's computer or a very high bandwidth connection from the server to the user's computer. The sophistication of the simulation, and thereby the user's enjoyment, is limited by the constraints of moving data to the user.

Using present technology, it is difficult or impossible to play such multi-player  
25 games using mobile equipment. Data transmission limits adversely affect the number of players with whom a server may communicate, and there is no practical method available to transmit such data to the users.

Furthermore, there are other potential types of interactive entertainment that suffer from the same practical limitations, the development of which have been limited by the  
30 lack of available hardware to support such applications.

It would therefore be desirable to develop a mobile multi-player computer game device that was mobile, would use less redundant downstream (server to user) transmission, and would not be dependent upon Internet congestion.

## SUMMARY OF THE INVENTION

The present invention comprises a system, method and apparatus for mobile multi-player interactive game playing and other interactive data activities. The system comprises a host server computer. The host server computer transmits data to one or 5 more broadcast facilities, either through traditional radio frequency broadcasting or through transmission over high bandwidth cable. Individual users have a remote entertainment system comprising a processor, a memory and a display. Each remote entertainment system is capable of receiving the broadcast data from the host server computer, as well as further comprising means for transmitting data to the host server 10 computer. Such data transmission means include wireless transmission, as well as connectors for various other data transmission paths such as telephone, cable television cables, and other data transmission channels that will be known to those skilled in the data transmission arts. By transmitting data from the network (host) server by broadcasting, identical data comprising programming for the processors is simultaneously 15 broadcast by the network transmitter to a plurality of the remote receivers of the remote user entertainment systems.

Typically, the host server computer's data would include information about a large number of users simultaneously, such as the locations, status and actions of multiple players and computer-controlled objects within a simulated environment. Each user's 20 remote entertainment system would utilize this information to generate the various displays and game play options.

In some embodiments of the present invention, wireless remote entertainment systems are capable of communicating directly with each other absent connection to a centralized host server computer. In several of these embodiments, the host server 25 computer broadcasts updates to the entertainment software and perhaps transmits software encryption keys to authorize the wireless remote entertainment systems to operate for a predetermined time or amount of usage, or activates an otherwise locked system to operate permanently.

In various embodiments the remote entertainment system may comprise one or 30 more components to enhance the user-computer interface, including video displays, sound generation devices, virtual reality goggles, simulated user input devices such as mock steering wheels, guns, joysticks, and other devices known in the video game arts.

## DESCRIPTION OF THE FIGURES

Figure 1 is a block diagram of one embodiment of the system of the present invention.

5 Figure 2 illustrates an overhead view of an example of a simulated gaming environment used in accordance to the present invention.

Figure 3 illustrates a first-person view of the simulated gaming environment of Figure 2.

Figure 4 is a representation of an embodiment of a portable game unit according to the present invention.

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## DETAILED DESCRIPTION OF THE INVENTION

The general operation of one embodiment of the present invention is best understood with reference to Figure 1, which is a block diagram of an entertainment network with multiple (N) users.

15

In this embodiment a network 10 comprises a centralized computer entertainment application server 20 on which resides data necessary for operation of the game. The network has at least one network receiver 30 communicating with entertainment application server 20 via a receiver communications link 22. Network receiver 30 may include any of a variety of data processors to provide necessary queuing, timing, synchronization and data manipulation to coordinate large numbers of remote users communication with computer entertainment application server 20.

The network further includes at least one network transmitter 40 that receives data from entertainment application server 20 via a transmitter communications link 24 for broadcast to remote users. Network transmitter 40 broadcasts the data from entertainment application server 20 as described in further detail below.

25

A plurality of remote user entertainment systems 50 communicate with network 10. Each such remote user entertainment system 50 comprises a processor 56, a memory 58, a display 60, a remote receiver 52 and a remote transmitter 54. Each remote receiver 52 receives an identical data stream broadcast from network transmitter 40 via a downstream communications channel 42. Each remote transmitter 54 transmits data specific to that remote user entertainment system 50 to network receiver 30 over a separate upstream communications channel 32. Hence, there are a plurality of upstream

communications channels 32 carrying data from remote user entertainment systems 50 to network receiver 30.

More specifically, downstream communications channel 42 may be any of a variety of transmission methods, most notably wireless broadcast radio frequency 5 transmission or transmission over a cable television channel. The use of the term "radio frequency" herein does not limit use to the AM or FM radio bands, but is used illustratively to include a variety of bands used in radio, television and microwave transmission. Depending upon the data requirements of the system, such information may be transparently embedded into existing broadcast systems using a variety of 10 techniques, including using unused transmission bandwidth, or may be broadcast over a dedicated frequency or channel. In addition, the methods of embedding of data into a broadcast signal described in described in co-pending United States Patent Applications Serial Nos. 09/835,020, 09/892,215 and 09/909,760 may be used to transmit the data. In such an embodiment the remote user entertainment systems 50 would have to decode the 15 received signal to extract the entertainment program data embedded therein.

Network transmitter 40 would transmit the same data over downstream communications channel 42 to all users served by said network transmitter 40. The processor 56 of each remote user entertainment system 50 would extract that information relevant to that user, as described in greater detail below.

20 Also, a plurality of such network transmitters 40 may be needed to reach users in different locations, depending on the requirements of downstream communications channel 42. In one embodiment of the invention, each individual network transmitter 40 only receives from entertainment application server 20 information needed by the remote user entertainment systems 50 served by that network transmitter 40 at that particular 25 time. In other embodiments all data related to the game would be transmitted to all remote user entertainment systems 50 over all network transmitters 40.

Upstream communications channel 32 need not convey data at as high a data rate as downstream communications channel 42, as the volume of data needed to be transmitted by remote user entertainment systems 50 to entertainment application server 30 20 will be far less than that of the downstream path. Hence, upstream communications channel 32 may utilize a variety of conventional transmission technologies, including wireless or cellular transmission, telephone connections, Internet connections or cable

telephony, and the data may be packetized using TCP/IP, ATM or other transmission protocols known to those skilled in the art of data communications.

For example, in an embodiment of the present invention, a plurality of upstream communications channels 32 share a common transmission frequency or path. Using 5 conventional packet routing techniques such as time division multiplexing, these channels may be broadcast over a common signal, thereby minimizing the amount of spectrum that must be allocated by the network. Coordination of upstream transmission by the plurality of remote user entertainment systems 50 may be synchronized to control signals embedded within the downstream data signal, or through other methods that will be 10 obvious to those skilled in the art of data communications.

The use of computer data for such an entertainment system is best understood in light of an illustrative example, using the illustrative network of Figure 1. For example, consider a first-person virtual combat simulation, in which each player views a simulated combat environment from a natural perspective, as if in the game environment. Such 15 simulations are common among MMORPGs discussed above. Figure 2 illustrates a view from above of two players within such a virtual combat environment, while Figure 3 illustrates the view as seen from the perspective of virtual character 110 of Figure 2. The view of Figure 3 is illustrative of the type of visual information that the remote user entertainment system 50 of the user controlling virtual character 110.

Figure 3 demonstrates that in order to generate the appropriate view for remote user entertainment systems 50, information is needed for fixed environmental elements, such as window 140 in wall 130, as well as the location and orientation of other virtual characters, such as virtual character 120. In some virtual gaming environments, many of the fixed environmental elements are previously known to all players. These elements 25 include not just the location of the environmental elements but also information needed to display an image of the environmental element on the display 60 of remote user entertainment system 50. Such information may be stored remotely in memory 58 of each remote user entertainment system 50, and need not be transmitted over downstream communications channel 42 in order to minimize the amount of data transferred over 30 downstream communications channel 42. However, such data may change dynamically over time, and each remote user entertainment system 50 must be able to receive over downstream communications channel 42 updates or patches to the information, or to the game or entertainment program itself.

Other information is not static, such as the spatial location, orientation and actions of virtual characters such as virtual characters 110 and 120. For example, virtual character 110 may fire a missile weapon, such as a pistol 112, at virtual character 120 by moving cursor 150 over the image of virtual character 120 in Figure 3. The success or failure of such an action is dependent upon random factors as well as the placement of cursor 150 and intervening obstacles such as wall 130.

Hence, upstream communications channel 32 must convey information about the orientation of cursor 150, as well as instructions regarding the orientation, movement and other actions of virtual character 110. In practice, this amount of information will be minimal and will require very low upstream bandwidth.

In a simulation involving a large number of players, the amount of data conveyed to each remote user entertainment system 50 may be large. However, much of that information will be irrelevant to that system's user. One example of such irrelevant information is data related to virtual characters too far from the user's virtual character to engage in actions or to be influenced by their actions. By structuring the data in ways known to those skilled in the art, such as dividing the virtual environment into regions, remote user entertainment systems 50 may disregard such irrelevant information. In this manner each remote user entertainment system 50 may process a manageable amount of data.

In one embodiment, upstream communications channel 32 and downstream communications channel 42 both utilize appropriate wireless technology to provide a mobile entertainment system. For example, Figure 4 illustrates a remote user entertainment system 50 in the form of a handheld video game unit 210 with a built-in radio frequency receiver as remote receiver 52 and a cellular telephone transmitter as remote transmitter 54.

Alternatively, such a handheld video game unit 210 may be wirelessly connected to a remote user entertainment system 50 as described herein, whereby such remote user entertainment system 50 serves as a base system and one or more handheld video game units 210 communicate wirelessly with said remote user entertainment system 50, providing limited mobility for the user. In such a system remote user entertainment system 50 may be incorporated into a home gaming console unit; a personal computer with an Internet connection to serve as an upstream communications channel 32, or other

consumer electronic device (e.g., televisions, digital cable decoder box, digital recording systems, etc.).

Handheld video game unit 210 has an antenna 230 for use with that radio frequency receiver, as well as a video display 220 for display of the games. A plurality of controls features, including a joystick 240 and control buttons 250, are shown to allow users to make a variety of actions, as is well known in the video game controller art. The actual design and construction of such a unit will be dependent upon the needs of the individual handheld video game unit 210.

In a related embodiment, a standard personal digital assistant (PDA) or a portable computer may be enhanced to provide remote entertainment capabilities by addition of a card or other modular electronic device with the capabilities described above. The actual implementation of such a modular electronic device will be dependent upon the hardware of the existing portable electronic data processing system, and will be obvious to those skilled in the art based upon the foregoing description of the operation of the present invention.

In various embodiments the remote entertainment system may comprise one or more components to enhance the user-computer interface, including video displays, sound generation devices, virtual reality goggles, simulated user input devices such as mock steering wheels, guns, joysticks, and other devices known in the video game arts.

It should be noted that use of such datacasting techniques over downstream communications channel 42 allows for a more efficient transmission of data, and may reduce the amount of data storage needed in remote user entertainment systems 50 by shifting from the present approach of storing data on the user's computer to conserve bandwidth. Indeed, using a high enough bandwidth downstream communications channel 42, simpler games and entertainment applications may be broadcast over downstream communications channel 42 to remote user entertainment systems 50 that have a minimal set of stored data or no stored data at all regarding the application. In this manner the user may, in some embodiments, select from a plurality of available games or entertainment applications, perhaps with minimal or no data regarding the application permanently stored within the remote user entertainment system 50's memory 58.

In addition, such embodiments would allow the user to sample a demonstration of a game or entertainment application. A game or entertainment application would be broadcast to users, including those not authorized to access entertainment application

server 20 using upstream communications channel 32. A remote user entertainment system 50 would still receive data regarding the application, but the user could not transmit upstream to fully interact with the simulation, game or other entertainment. Nevertheless, the user can access a demonstration of the application, and might even 5 perform any actions available locally on remote user entertainment system 50 that do not require access to entertainment application server 20.

For example, a bingo game application could allow full interaction using chats between players, allow the players to be ranked with stored scores on entertainment application server 20, provide prizes, and other interactions between multiple users and 10 entertainment application server 20. In demo mode the user might be able to see the numbers called, but the user could not access the advanced features.

Such a demonstration mode feature would be valuable for advertising new games or entertainment applications for existing remote user entertainment systems 50.

Further, using the data embedding techniques described in co-pending United 15 States Patent Applications Serial Nos. 09/835,020, 09/892,215 and 09/909,760, such demonstration features may be embedded into a commercial advertisement for the entertainment itself. In this manner the advertisement would catch the user's attention and the embedded demonstration would allow the user to preview the application.

The entertainment application or game may also be embedded into a related 20 broadcast feature. For example, a game may be provided whereby users gain points from predicting the outcome of a play in a sporting event, such as whether a baseball hitter will get a ball, a strike or a hit, whether a football play will be a pass or a rush, etc. Such interactive game's data may be embedded within the sporting event's television broadcast signal. A demonstration mode for the game may allow the predictive elements to be 25 accessed without allowing inter-user communications or ranking of points.

The system and method described above may be utilized for commercial purposes in a variety of ways. Fully interactive functionality using upstream communications channel 32 may be charged on a metered basis (by minute or data throughput), on a per-access basis, or on subscription basis (e.g., weekly, monthly, quarterly or annually). 30 Applications may be distributed encrypted with users needing to purchase a key either separately or via upstream communications channel 32. Users may subscribe to a channel providing access to one or more applications, with such applications either being stored in

remote user entertainment system 50 or being received in a repetitive broadcast and accessed each time the user chooses that application.

Furthermore, upstream access and interactivity between users may not be required or even desired in a system wherein a plurality of simple simulations programs are continuously broadcast to users, with the users selecting the application they desire. For example, a solitaire card game channel might continuously broadcast a plurality of card game programs. The remote user entertainment system 50 would not store any such games, or only store a kernel of software common to a plurality of such games. When the user wishes to play a game, a menu would be accessed on remote user entertainment system 50, a particular game would be selected, and the data for the selected game program would be saved to the memory 58 of remote user entertainment system 50 the next time that the game software is transmitted.

While the above discussion relates to multi-user interactive electronic games, a variety of other interactive entertainment applications are appropriate for use with the present invention. For example, interactive polls of users could be based upon the commonly transmitted data over downstream communications channel 42. In general, many of the applications presently associated with interactive television would be adaptable to the present invention. Nothing contained herein is intended to limit the scope of the applications usable by the system and method described herein.

Described herein is a system and method for portable multiple-user interactive electronic entertainment. Various modifications to the embodiments described above will become obvious to those skilled in the art of the present invention from the foregoing description and accompanying drawings. Accordingly, the present invention is to be limited solely by the scope of the following claims.

## CLAIMS

What is claimed is:

1. An interactive entertainment system comprising:  
a computer server having a network transmitter;  
5 a plurality of remote user entertainment systems, each of said remote user entertainment systems comprising a processor and a remote receiver;  
wherein identical data comprising programming for said processors is simultaneously broadcast by said network transmitter to a plurality of said remote receivers of said remote user entertainment systems.
- 10 2. An interactive entertainment system comprising:  
a computer server having a network transmitter and a network receiver;  
a plurality of remote user entertainment systems, each of said remote user entertainment systems comprising a processor, a remote receiver and a remote transmitter;  
15 wherein data comprising programming for said processors is broadcast by said network transmitter to a plurality of said remote receivers of said remote user entertainment systems.
- 20 3. The interactive entertainment system of claim 2 wherein said network transmitter comprises a radio frequency broadcast transmitter and wherein each said remote receiver comprises a radio frequency receiver.
4. The interactive system of claim 3 wherein said data comprising programming for said processors broadcast by said network transmitter is embedded into another signal broadcast by said network transmitter.
- 25 5. The interactive system of claim 4 wherein said broadcast is provided over a cable television signal.
6. The interactive system of claim 3 wherein said broadcast is provided wirelessly.
- 30 7. A portable interactive entertainment device for communicating with a centralized entertainment computer server having a network transmitter and a network receiver, said portable device comprising:

a processor;  
memory for storing data for operating said processor;  
a receiver for wirelessly receiving data from said centralized entertainment computer server; and  
5 a transmitter for wirelessly transmitting data to said centralized entertainment computer server.

8. A module for adding portable interactive capability to a handheld computing device comprising a processor, a memory and a display, the module for communicating with a centralized entertainment computer server having a network transmitter and a network receiver, said portable device comprising:  
a receiver for wirelessly receiving data from said centralized entertainment computer server; and  
a transmitter for wirelessly transmitting data to said centralized entertainment computer server;  
10 wherein said receiver receives data broadcast to a plurality of users and wherein the processor of said handheld computing device selects which of said data is intended for said processor.

9. An method of providing entertainment by a computer server having a network transmitter to a plurality of users having remote receivers, said method comprising:

simultaneous broadcast by the network transmitter of identical data to a plurality of said remote receivers of remote user entertainment systems.

10. A method of providing interactive entertainment by a computer server having a network transmitter and a network receiver to a plurality of users having remote entertainment systems including processors, memories, receivers and transmitters, said method comprising:

simultaneous broadcast by the network transmitter of identical data to a plurality of said remote receivers of remote user entertainment systems.

11. The method of claim 10 wherein said network transmitter comprises a  
30 radio frequency broadcast transmitter and wherein each said remote receiver comprises a

radio frequency receiver, and wherein said broadcast further comprises broadcasting said data using radio frequency broadcast.

12. The method of claim 11 further comprising the steps of:  
the network transmitter embedding the data comprising programming for said  
processors into another signal broadcast by the network transmitter; and  
the remote user entertainment system decoding the received signal to extract the  
embedded data from the other signal.  
5

13. The method of claim 12 wherein said broadcast is provided via cable  
television signal channel

10 14. The method of claim 11 wherein the data comprises updates to  
programming already stored on memory in the remote user entertainment systems.

15. A method of demonstrating interactive entertainment programming  
comprising data utilizing a centralized entertainment computer server having a transmitter  
and receiver on a remote user entertainment system having a transmitter, a receiver, a  
processor and a memory, said method comprising:  
15

broadcasting the data from the centralized entertainment computer transmitter;  
receiving on the remote user receiver a broadcast of said data;  
storing said data in the memory of the remote user entertainment system;  
using said data to operate the processor; and  
disabling transmission to the remote centralize entertainment computer server of  
20 data from the processor of remote user entertainment system.

16. An interactive entertainment system comprising:  
an application server, for processing entertainment-related data stored therein,  
coupled to a network transmitter and to a network receiver; and  
25 a plurality of remote user entertainment systems, each comprising a processor  
coupled to a remote receiver and a remote transmitter;  
wherein a downstream signal comprising said entertainment-related data is  
broadcast by said network transmitter to a plurality of said remote  
receivers;

wherein said processor extracts, from said downstream signal received by said remote receiver, said entertainment-related data relevant to a user of a corresponding remote user entertainment system, and processes the data to generate processed data;

5        wherein said remote transmitter sends an upstream signal, containing said processed data, to said network receiver; and

wherein said network receiver receives said upstream signal from a plurality of said remote transmitters for processing by said application server.

17.        The interactive entertainment system of claim 16, wherein said broadcast  
10      is effected via radio frequency transmission.

18.        The interactive entertainment system of claim 16, wherein said broadcast  
is effected via a cable television channel.

19.        The interactive entertainment system of claim 16, wherein a plurality of  
upstream signals share a common transmission medium.

15        20.        A method for providing interactive entertainment between an application  
server and a plurality of remote user entertainment systems, each of the systems  
comprising a processor coupled to a remote receiver and a remote transmitter; wherein  
said application server is coupled to a network transmitter and to a network receiver, and  
processes entertainment-related data stored therein, the method comprising:

20        broadcasting, by said network transmitter, a downstream signal comprising said  
entertainment-related data, to a plurality of said remote receivers;  
extracting, by said processor, from said downstream signal received by said  
remote receiver, said entertainment-related data relevant to a user of a  
corresponding remote user entertainment system;

25        processing the data to generate processed data;

sending, by said remote transmitter, an upstream signal containing said processed  
data, to said network receiver; and

receiving, by said network receiver, said upstream signal from a plurality of said  
remote transmitters for processing by said application server.

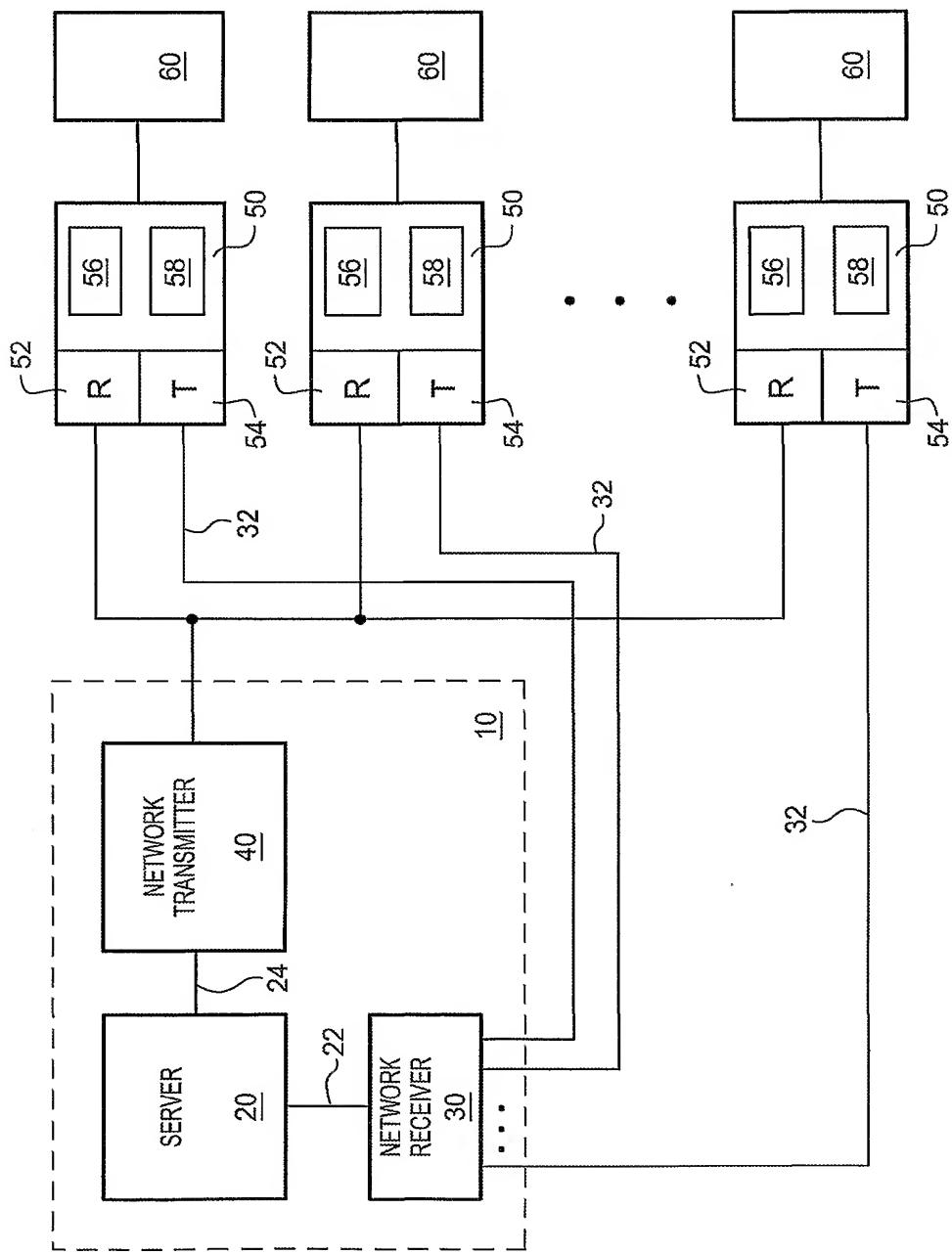
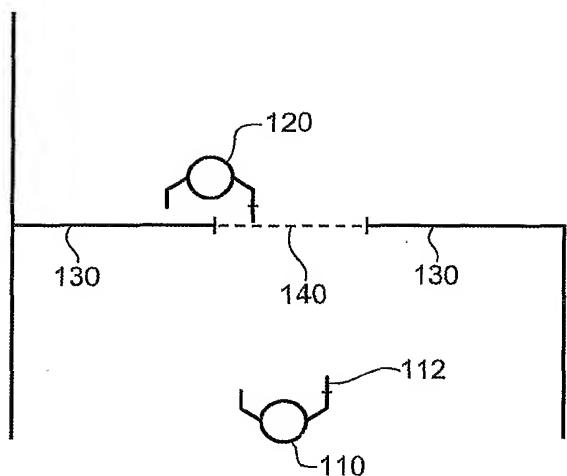
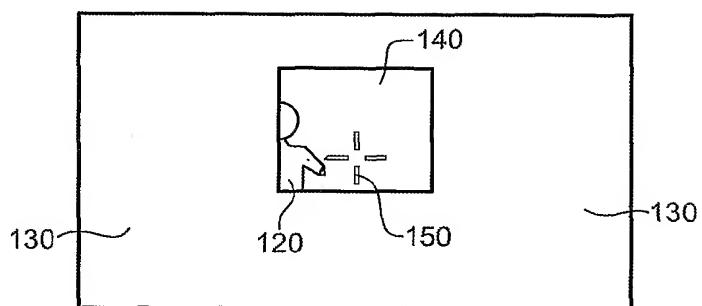
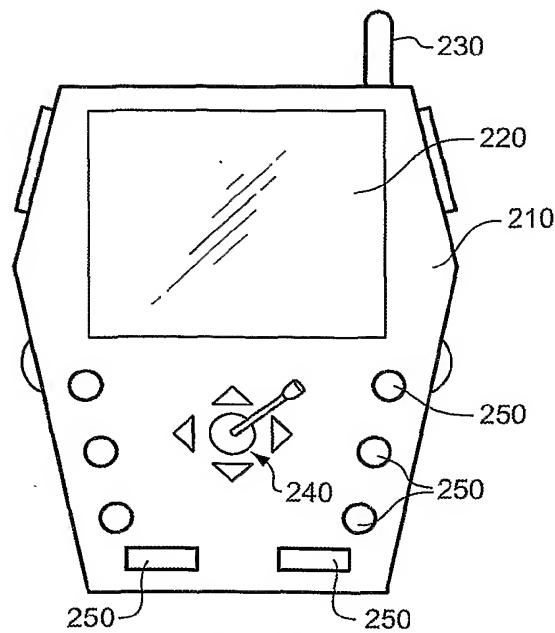


FIG. 1

**FIG. 2****FIG. 3****FIG. 4**

## INTERNATIONAL SEARCH REPORT

International application No. PCT/US01/50266
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**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(7) : A63F 13/00  
US CL : 463/40

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 463/40-43

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
internet search and aps search

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6,052,120 A (NAHI et al) 18 April 2000, see entire document	1-20
Y	US 6,006,256 A (ZDEPSKI et al) 21 December 1999, see entire document	1-20
Y, E	US 6,354,946 B1 (FINN) 12 March 2002, see entire document	1-20
Y	US 5,673,322 A (PEPE et al) 30 September 1997, see entire document	1-20
Y	US 5,618,045 A (KAGEN et al) 08 April 1997, see entire document	1-20
Y, P	US 6,287,200 B1 (SHARMA) 11 September 2001, see entire document	1-20

Further documents are listed in the continuation of Box C.  See patent family annex.

* Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"		document defining the general state of the art which is not considered to be of particular relevance
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"P"	"&"	document published prior to the international filing date but later than the priority date claimed

Date of the actual completion of the international search  04 APRIL 2002	Date of mailing of the international search report  23 APR 2002
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer  JOHN M. HOTALING II Telephone No. (703) 305-0780  <i>Sigila Veney</i> Paralegal Specialist Technology Center 3700

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US01/50266

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 6,128,661 A (FLANAGIN et al) 03 October 2000, see entire document	1-20
Y, P	US 6,320,495 B1 (SPORGIS) 20 November 2001, see entire document	1-20
Y, P	US 6,186,145 B1 (BROWN) 13 February 2001, see entire document	1-20
Y, P	US 6,201,948 B1 (COOK et al) 13 March 2001, see entire document	1-20